

TYPE N1 CARRIER TELEPHONE SYSTEM — TERMINAL EQUIPMENT
CHANNEL UNIT LINE-UP — RECEIVING
MEASUREMENT OF INDIVIDUAL CHANNEL CARRIER AT THE R1 JACKS
AND
CHANNEL REGULATOR AND DEMODULATOR OUTPUT TESTS AND ADJUSTMENTS

This section includes information for testing and adjusting original and modified channel regulators on fully and partially equipped systems. *Original and modified channel units with improved regulators are identified by their ED drawing numbers on the handle on the subassembly.*

This section is revised to change the procedure for modified regulators and to make other changes.

The R1 jack on a channel unit is located at the output of the channel bandpass filter. In the test for the channel units with modified regulators, the channel carrier is adjusted for a specified level at the R1 jack. The test for channel units with the original regulators consists of a measurement at the R1 jack at the time of line-up for reference in subsequent in-service measurements.

The channel regulator operates on received carrier power. The potentiometer at the input to the regulator permits adjustment of the carrier level to the middle of the regulator operating range. The output of the regulator is fed into the demodulator, which separates the sidebands from the carrier and produces the speech currents and 3700-Hz signaling tone.

The compressor output and the channel carrier level should be properly adjusted at the M2 jack at the transmitting terminal, and the individual channel carrier measurements at the receive group unit output should be checked as covered in other sections in this division of sections before these tests are made.

APPARATUS:

- 1 — KS-14510 Volt-Ohm-Milliammeter (VOM), or equivalent (20,000 ohms per volt)
- 1 — Hewlett-Packard 400-Type Vacuum Tube Voltmeter (VTVM)
- 1 — W2DW Cord (used with VTVM)
- 1 — Channel Unit Test Stand (J98705M)
- 1 — P19A Cord
- 1 — 262B Plug (600-Ohm)

STEP	PROCEDURE												
<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p>	<p style="text-align: center;">A. Channel Units with Original Regulators</p> <p>Remove the channel from service and place the channel unit in the channel unit test stand as shown in the test setup in Fig. 1.</p> <p>Connect the VTVM between the R1 jack of the channel unit and the GRD jack on the channel unit test stand. Read the dB scale on the meter and record the reading. The channel carrier level will depend upon the number of channels in use in the system.</p> <p>Requirement 1: The measurement on each channel should be within the following requirements:</p> <table border="0" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">NUMBER OF CHANNELS IN USE</th> <th style="text-align: center;">INDIVIDUAL CHANNEL CARRIER LEVEL</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">All</td> <td style="text-align: center;">-21.0 ±8.0 dB</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">-20.0 ±8.0 dB</td> </tr> <tr> <td style="text-align: center;">8</td> <td style="text-align: center;">-19.0 ±8.0 dB</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">-18.0 ±8.0 dB</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">-16.0 ±8.0 dB</td> </tr> </tbody> </table> <p>Requirement 2: The difference in levels between adjacent channels in the system should not exceed 5 dB.</p> <p>Note: It is possible that the measurement on channel 1 may not meet the requirements under certain conditions. In these cases and <i>at the discretion of the Transmission Engineer</i>, channel 1 may be replaced with channel 13, or the limits for channel 1 may be relaxed an additional 5 dB.</p> <p>Remove the VTVM test connections.</p> <p>Caution: The regulator R2 (Fig. 2) test jack is at a potential of approximately 125 volts. Accidental grounding of the R2 jack during the following steps may result in damage to resistor R120.</p> <p>Set the VOM to the high-voltage dc scale. Connect the positive (+) terminal of the VOM to the +130 volt test jack on the channel unit test stand, and connect the negative (-) terminal of the VOM to the R2 jack at the side of the regulator subassembly.</p> <p>Set the VOM to the 12-volt dc scale and read the meter.</p> <p>Requirement: 3.0 ±0.4 volts.</p> <p>If the requirement of Step 5 is not met, adjust the REG potentiometer to obtain 3.0 volts. Return the VOM to the high-voltage scale. If the requirement is still not met, replace the regulator tube and recheck.</p>	NUMBER OF CHANNELS IN USE	INDIVIDUAL CHANNEL CARRIER LEVEL	All	-21.0 ±8.0 dB	10	-20.0 ±8.0 dB	8	-19.0 ±8.0 dB	6	-18.0 ±8.0 dB	4	-16.0 ±8.0 dB
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STEP	PROCEDURE						
7	Remove the VOM test connections.						
	At the Transmitting (Distant) Terminal						
8	<p>Patch a 1000-Hz test tone to the MOD IN jacks, or equivalent VF IN jacks, at the channel patch jack bay. Use the proper test tone power shown below:</p> <table data-bbox="568 546 1347 724"> <tr> <td>2-wire operation</td> <td>0 dBm</td> </tr> <tr> <td>4-wire operation</td> <td>-16 dBm (-16 and +7 offices)</td> </tr> <tr> <td>4-wire operation</td> <td>-13 dBm (-13 and +4 offices)</td> </tr> </table>	2-wire operation	0 dBm	4-wire operation	-16 dBm (-16 and +7 offices)	4-wire operation	-13 dBm (-13 and +4 offices)
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9	<p>If jack appearances are not available, the channel unit can be removed from the terminal and reconnected using the channel unit test stand. Then a 1000-Hz test tone is patched to the VF IN jacks of the channel unit test stand. Use the proper test tone power shown below:</p> <table data-bbox="568 924 1039 1029"> <tr> <td>2-wire operation</td> <td>0 dBm</td> </tr> <tr> <td>4-wire operation</td> <td>-16 dBm</td> </tr> </table>	2-wire operation	0 dBm	4-wire operation	-16 dBm		
2-wire operation	0 dBm						
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10	<p>Place the channel in an "off-hook" condition, through the use of a 2B signaling test set, by opening the M lead and connecting the M jack to the -40V jack or other suitable means.</p>						
	At the Receiving (Local) Terminal						
11	<p>Connect the VTVM from terminal 6 (outside center terminal) on the FL42 filter (the 168-type filter in the expander-signaling subassembly) to the GRD jack on the test stand and read the meter.</p>						
	Requirement: The reading on the meter should be $+12.5 \pm 1.5$ dB.						
12	Terminate the VF OUT or DEMOD OUT jacks with a 262B plug.						
13	Connect the VTVM to the E1-E2 jacks in the front of the channel unit.						
14	Adjust the EXP potentiometer on the channel unit for a reading on the meter of +10.0 dB.						
15	Connect the VTVM between terminal 3 (center terminal) on the REG potentiometer and the GRD jack on the test stand. Read the dB scale on the meter and record the reading.						
16	Adjust the REG potentiometer for a dB reading on the meter of 5 dB less than the value recorded in Step 15.						

STEP	PROCEDURE												
17	<p>Connect the VTVM to the E1-E2 jacks on the channel unit.</p> <p>Requirement: The reading on the VTVM should be between +8.5 and +10.5 dB.</p> <p>Note: If the test procedures in Steps 1 through 17 do not meet the requirements, replace the V102 tube and recheck the regulator performance. If the requirements are still not met, replace the carrier frequency subassembly.</p>												
18	<p>Connect the VTVM between terminal 3 (center terminal) on the REG potentiometer and the GRD jack on the test stand.</p>												
19	<p>Readjust the REG potentiometer for the dB reading recorded in Step 15.</p>												
20	<p>Remove the test connections and 262B plug and replace the channel unit in the terminal mounting.</p>												
21	<p>Connect the VTVM between the R1 jack on the channel unit and chassis ground. Measure the value in dB on the meter and record on Form E-4559 for future reference.</p> <p>Requirement: When the carrier level is measured at the R1 jack during subsequent maintenance tests, the VTVM meter reading should be the recorded value in dB ± 5.0 dB.</p>												
22	<p>Remove the test connections and place the channel back in service.</p>												
<p>B. Channel Units with Modified Regulators</p>													
1	<p>Remove the channel from service and place the channel unit in the channel unit test stand as shown in the test setup in Fig. 1.</p>												
2	<p>Connect the VTVM between the R1 jack of the channel unit and the GRD jack on the channel unit test stand.</p>												
3	<p>Turn the REG potentiometer for maximum output. Read the dB scale on the meter. The channel carrier level will depend upon the number of channels in use in the system.</p>												
<p>Requirement 1: The measurement on each channel should be within the following requirements:</p>													
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STEP	PROCEDURE				
3 (cont)	<p>Requirement 2: The difference in levels between adjacent channels in the system should not exceed 5 dB.</p> <p>Note: It is possible that the measurement on channel 1 may not meet the requirements under certain conditions. In these cases and <i>at the discretion of the Transmission Engineer</i>, channel 1 may be replaced with channel 13, or the limits for channel 1 may be relaxed an additional 5 dB.</p>				
4	Adjust the REG potentiometer for a reading on the meter of -33.0 dB.				
5	Remove the test connections.				
	At the Transmitting (Distant) Terminal				
6	Patch a 1000-Hz test tone to the MOD IN jacks, or equivalent VF IN jacks, at the patch jack bay. Use the proper test power shown below:				
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7	<p>If jack appearances are not available, the channel unit can be removed from the terminal and reconnected using the channel unit test stand. Then a 1000-Hz test tone is patched to the VF IN jacks of the channel unit test stand. Use the proper test tone power shown below:</p> <table data-bbox="565 1203 1031 1228"> <tr> <td>2-wire operation</td> <td>0 dBm</td> </tr> </table> <table data-bbox="565 1255 1031 1281"> <tr> <td>4-wire operation</td> <td>-16 dBm</td> </tr> </table>	2-wire operation	0 dBm	4-wire operation	-16 dBm
2-wire operation	0 dBm				
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8	<p>Place the channel in an "off-hook" condition, through the use of a 2B signaling test set, by opening the M lead and connecting the M jack to the $-40V$ jack or other suitable means.</p> <p>At the Receiving (Local) Terminal</p>				
9	<p>Connect the VTVM between terminal 6 (outside center terminal) on the FL42 filter (the 168-type filter in the expander-signaling subassembly) and the GRD jack on the test stand.</p> <p>Requirement: The reading on the meter should be $+12.5 \pm 1.5$ dB.</p>				
10	Terminate the VF OUT or DEMOD OUT jacks with a 262B plug.				
11	Connect the VTVM between the E1-E2 jacks on the front of the channel unit.				
12	Adjust the EXP potentiometer for a reading on the meter of $+10.0$ dB.				

SECTION 362-030-501

STEP	PROCEDURE
13	Connect the VTVM between the R1 jack (Fig. 3) on the channel unit and the GRD jack on the test stand.
14	Adjust the REG potentiometer for a reading on the meter of -41.0 dB.
15	Connect the VTVM to the E1-E2 jacks on the front of the channel unit and read the meter. <i>Requirement:</i> The reading on the meter should be between $+9.0$ and $+10.5$ dB. <i>Note:</i> If the test procedures in Steps 1 through 15 do not meet the requirements, replace the V102 tube and recheck the regulator performance. If the requirements are still not met, replace the carrier frequency subassembly.
16	Connect the VTVM between the R1 jack on the front of the channel unit and the GRD jack on the test stand.
17	Adjust the REG potentiometer for a reading on the meter of -33.0 dB.
18	When the carrier level is measured at the R1 jack during subsequent maintenance tests, the VTVM meter reading should be -33.0 ± 5.0 dB.
→ 19	Remove the test connections and 262B plug and place the channel back in service.

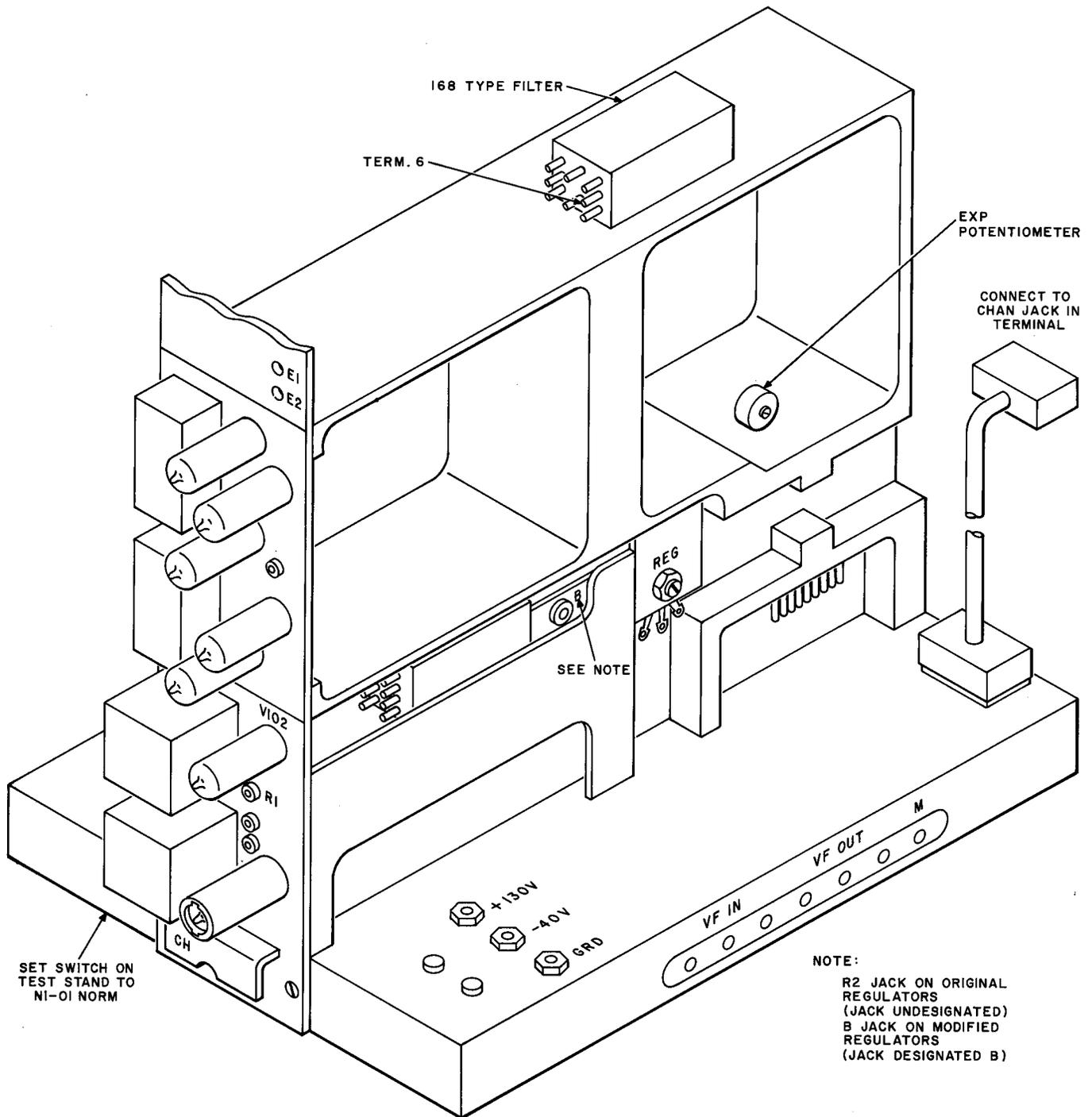


Fig. 1 — Test Setup

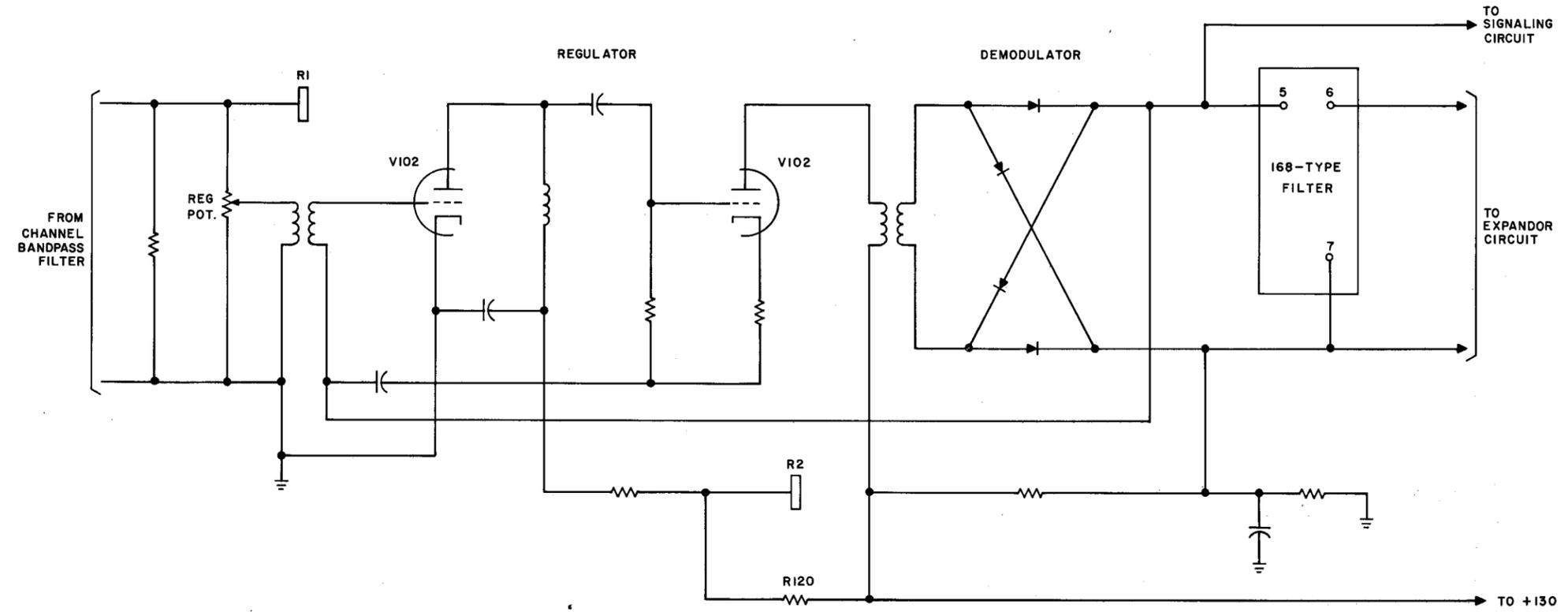


Fig. 2 - Original Channel Regulator Circuit

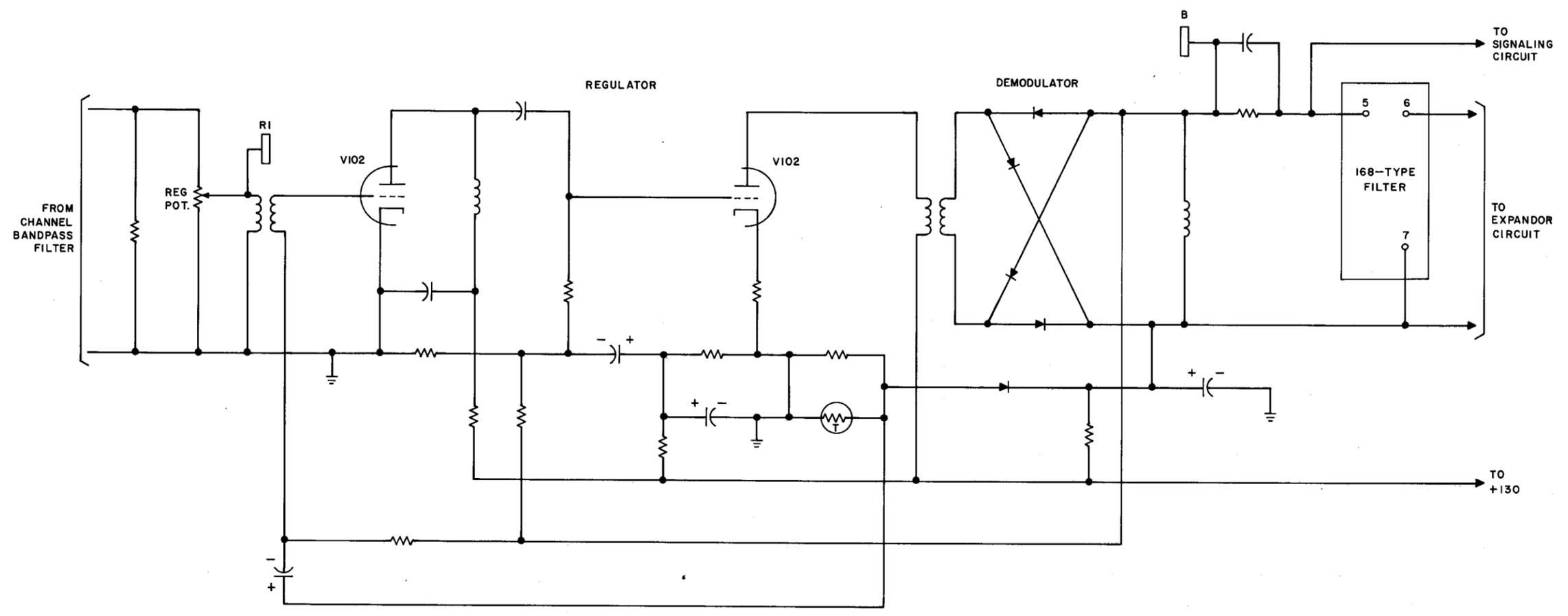


Fig. 3 - Modified Channel Regulator Circuit